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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,872	01/12/2004	Saad Ahmed Sirohey	135488CT (15163US01)	9393

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EXAMINER	
KRASNIC, BERNARD	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/756,872	SIROHEY ET AL.	
	Examiner	Art Unit	
	BERNARD KRASNIC	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. The amendment filed 1/15/2008 have been entered and made of record.

2. The application has pending claim(s) 1-31.

3. Applicant's arguments filed 1/15/2008 have been fully considered but they are not persuasive.

The Applicant alleges, "With respect to claims 1-16 and 24-31 ..." in page 7, "More specifically, the Examiner's ..." in pages 7-8, "As stated in Summers, Figure 1 ..." in page 8, "Figure 1 of Summers is not an ..." in page 8, and "The Examiner's statements regarding the relationship ..." in pages 8-9, and states respectively that the Examiner's statement that "Fig. 3b is surface unfolded to produce the 2D visual display as shown in Fig. 1b" is not correct because Figure 1 does not illustrate an unfolded surface or a 2D visual display but rather a magnified portion of the colonic surface demonstrating the detection of polyps on a fold and between two folds. The Examiner disagrees because Figure 1 is a hypothetical portion of the colonic surface describing polyp detection by displaying in an unfolded manner [when a user views the display and visually see's between two folds of a colonic surface, it is because the colonic surface is layed flat / unfolded like in Figure 1b]. The Examiner used the term unfolded to describe Figure 1 because that is the clear visualization of the colon, it is an unfolded portion as could also be similarly compared to the prior art reference Bartroli colon

unfolding [see Bartroli, Figure 1, the left part of Bartroi's figure is similar to Summer's Figure 3b and Bartroli's right part of figure 1 which is a visual display of a virtual unfolding of a segment of the CT data set of the colon resembles Summer's Figure 1b]. This argument was explored in the Examiner's Non-Final rejection [see page 4] when the Examiner states that "although Summer doesn't specifically disclose that the surface unfolded image is a 2D image it is well known in the art at the time the invention was made to have the unfolded image be 2D because unfolding is accomplished using distance mapping from the center of the colon pipe as is discussed in Bartroli [see Bartroli, abstract, right side of Fig. 1]". Also Summers discloses that different Computer-assisted diagnostic methods are directed to improve the physicians attention to site likely harboring polyps both in two and three dimensions [see pg 289, paragraph "As currently practiced, analysis at ..." and paragraph "Measurement of curvature is a standard image ..."]. Therefore, although Summers doesn't specifically disclose that figure 1b is an unfolded version of figure 3b, there is motivation to lead one of ordinary skill in the art at the time of the invention to distinguish that figure 1b is indeed an unfolded version of figure 3b using the teachings of Bartroli's Figure 1 which visually is the exact same type of display as of Summers' figures 1b and 3b [Bartroli's Figure 1 once again shows a 3D colon being processed to a 2D virtually unfolded colon segment]. The Examiner still maintains the 35 U.S.C. 103 rejection. Therefore claims 1-16 and 24-31 are still not in condition for allowance because they are still not patentably distinguishable over the prior art of record.

The Applicant alleges, "With respect to claims 17-23, the Applicants ..." in page 9 and "The Examiner also states that ..." in pages 9-10, and states respectively the same arguments as toward claims 1-16 and 24-31 above of how Summers does not disclose an unfolded or 2D display of the 3D colon. The Examiner maintains the arguments as above and maintains the 35 U.S.C. 103 rejection. Therefore claims 17-23 are still not in condition for allowance because they are still not patentably distinguishable over the prior art of record.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-16 and 24-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Summers ("Automated Polyp Detector for CT Colonography: Feasibility Study" – Radiology 2000; 216: pp. 284-290) in view of Bartroli ("Nonlinear Virtual Colon Unfolding" - IEEE - pages 411-418, Oct. 2001, as discussed in previous Office Action), and further in view of Krishnan et al (US 2004/0013290 A1, as discussed in previous Office Action).

Re Claim 9: Summers discloses a system for displaying a set of data with a virtually dissected anatomical structure / colon (see Summers, page 289, Section – Discussion, paragraph 2 ["As currently practiced ..."] and paragraph 5 ["The number of false-

positives ..."], page 284, abstract ["An abdominal computed tomographic scan ..."], Figure 1), said system comprising a computation unit / shape-based polyp detector for computing display index values / shape and curvature features corresponding to object shapes / polyps, folds, false-positives, etc. in said first set of data / 3D colon structure (see page 286, paragraph 2 ["Additional, more restrictive criteria ..."], Figure 3a-c, the 3D colon structure using the shape and curvature criterion is considered and different geometric shapes are noted into a 3D data set representing different fundamental shape features by color encoding as shown in Figs. 3b); an assignment unit / color encoding for assigning display attributes / color to said display index values / 3D shape and curvature features (see page 286, paragraph 4 ["Transverse CT scans through ..."], lines 12-15, Figure 3b, the 3D colon structure using the shape and curvature criterion is considered and different geometric shapes are noted into a 3D data set representing different fundamental shape features by color encoding as shown in Figs. 3b); a mapping unit / surface unfolding for distance mapping from a reference axis / center of colon pipe said display index values / 3D shape and curvature features from the first set of data / 3D colon structure to a third set of data / 2D polyp detected images (see Figs. 3b and 1b, the 3D color encoded polyp image as shown in Fig. 3b is surface unfolded to produce the 2D visual display as shown in Fig. 1b, although Summer doesn't specifically disclose that the surface unfolded image is a 2D image it is well known in the art at the time the invention was made to have the unfolded image be 2D because unfolding is accomplished using distance mapping from the center of the colon pipe as is discussed in Bartroli [see Bartroli, abstract, right side of Fig. 1]).

However, Summers fails to disclose a virtual dissection unit for creating a virtual dissection of the anatomical structure by mapping a first set of data to a second set of data wherein the second set of data corresponds to the virtual dissection and an overlay unit for organizing said third set of data for display with the virtually dissected anatomical structure.

Bartroli discloses a virtual dissection unit / nonlinear virtual colon unfolding (see Bartroli, title) for creating a virtual dissection / virtual colon unfolding of the anatomical structure / colon structure or tubular organ (see Bartroli, page 418, last sentence in Section – Conclusion and Future Work) by mapping a first set of data / 3D volume colon structure data to a second set of data / 2D unfolded map (see Bartroli, abstract and Section – Conclusion and Future Work) wherein the second set of data corresponds to the virtual dissection.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Summer's device using Bartroli's teachings by attaching the 2D virtual dissection unit for the overlaying unit in order to provide a different visualization technique to further enhance the polyp detection (see Bartroli, abstract).

However, Summer as modified by Bartroli, still fails to disclose or fairly suggest an overlay unit for organizing said third set of data for display with the virtually dissected anatomical structure.

Krishnan discloses an overlay unit / fusion (220) for organizing said third set of data for display with the virtually dissected anatomical structure (see Krishnan, Fig. 2,

paragraph [0006], lines 1-3, a fusion combiner combines two 2D data sets to create an enhanced view for a user diagnosis, therefore using the teachings of Summer and Bartroli, Bartroli's 2D unfolded map [representing the virtual dissection] is combined with Summer's 2D detected polyp image [representing the third set of data]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Summer's device, as modified by Bartroli, using Krishnan's teachings by attaching the overlay unit to further enhance the diagnosis and allow a user to view more useful information (see Krishnan, paragraph [0006], lines 1-3).

Re Claim 10: Summer further discloses an anatomical structure is the colon (see Summers, page 289, Section – Discussion, paragraph 2 ["As currently practiced …"] and paragraph 5 ["The number of false-positives …"], page 284, abstract ["An abdominal computed tomographic scan …"], Figure 3).

Re Claim 11: Summer further discloses the display attribute is color / color bar (see Figure 3b, the color encoded image identifies the shape and curvature features).

Re Claim 12: Summer further discloses highlighting unit / coloring unit within the polyp detection for highlighting / coloring select display index values / only parts of colon meeting both primary and restrictive shape and curvature features according to user input / program operator (see Figs. 3c and 4c, the primary and restrictive shape and

curvature features are colored or highlighted red-to-orange which are selected by the program operator or user).

Re Claim 13: Summer further discloses highlighted / coloring select said display index values / only parts of colon meeting both primary and restrictive shape and curvature features are shape data (see Summers, page 289, Section – Discussion, paragraph 2 ["As currently practiced ..."] and paragraph 5 ["The number of false-positives ..."], page 284, abstract ["An abdominal computed tomographic scan ..."], page 286, paragraph 2 ["Additional, more restrictive criteria ..."], page 286, paragraph 4 ["Transverse CT scans through ..."], lines 12-15).

Re Claims 14-15 respectively: Summer further discloses highlighted / coloring select display values / false-positives are fluid data and contrast enhanced fecal matter data (Although the current Summers article doesn't specifically disclose that the false-positives which are also highlighted in Fig. 3b are fluid data and contrast enhanced fecal matter data, a corresponding Summers article ["Challenges for computer-aided diagnosis for CT colonography" – 2002 - Abdom Imaging 27: pp. 268-274] clearly discloses distinguishing fecal matter and fluid [see Summers "Challenges for computer ...", page 268, paragraph 6 {"Radiologists can recognize a number of polyp mimics ..."}, page 271, paragraph 1 {"An important objective of CTC interpretation is ..."}]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a feature where the select display values or false-positives are fluid data

and contrast enhanced fecal matter data because these data's have there own specific shape, curvedness, and texture values and ranges which a detection could possibly be made for.).

Re Claim 16: Bartroli further discloses first set (the first set is represented by Summer's 3D colon structure as discussed above) of data is three-dimensional and said second / 2D unfolded map (see Bartroli, abstract and Section – Conclusion and Future Work) and third sets (the third set is represented by Summer's 2D detected polyp image as discussed above) of data are two-dimensional.

As to claims 1-8, the claims are the corresponding method claims to claims 9-16 respectively. The discussions are addressed with regard to claims 9-16.

As to claims 24-31, the claims are the corresponding computer readable medium encoded with a computer executable program claims to claims 9-16 respectively. The discussions are addressed with regard to claims 9-16.

6. Claims 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Summer ("Automated Polyp Detector ...") in view of Bartroli.
Re Claim 17: Summer discloses a method for viewing a virtually dissected anatomical structure / colon (see Figs. 3b and 1b, the 3D color encoded polyp image as shown in Fig. 3b is surface unfolded to produce the 2D visual display as shown in Fig. 1b,

although Summer doesn't specifically disclose that the surface unfolded image is a 2D image it is well known in the art at the time the invention was made to have the unfolded image be 2D because unfolding is accomplished using distance mapping from the center of the colon pipe as is discussed in Bartroli [see Bartroli, abstract, right side of Fig. 1]), said method comprising instructing by a user / program operator the display of a virtual dissection of an anatomical structure / colon (see Figs. 3a and 1a, the 3D colon image is surface unfolded to produce the 2D visual display as shown in Fig. 1a, page 289, Section – Discussion, paragraph 2 ["As currently practiced ..."] and paragraph 5 ["The number of false-positives ..."], page 284, abstract ["An abdominal computed tomographic scan ..."], page 286, paragraph 2 ["Additional, more restrictive criteria ..."], page 286, paragraph 4 ["Transverse CT scans through ..."], lines 12-15); selecting by a user / program operator various characteristics / shape and curvature criterion of the anatomical structure / colon for enhancement / coloring or highlighting (see Figs. 3b and 1b, the 3D color encoded polyp image as shown in Fig. 3b is surface unfolded to produce the 2D visual display as shown in Fig. 1b, different geometric shapes are enhanced with coloring or highlighting using the shape and curvature criterion set by the program operator); and observing by a user / program operator said selected characteristics / shape and curvature features and the virtual dissection / surface unfolded colon (the surface unfolded colon and the colored shape and curvature features are observed in a display by the program operator).

However, Summer fails to specifically disclose the surface unfolded colon is a virtual dissection anatomical structure.

Bartroli discloses that the anatomical structure is of a virtual dissected anatomical structure (see Bartroli, right side of Fig. 1, abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Summer's method using Bartroli's teachings by replacing Summer's surface unfolded anatomical colon structure with the virtual dissection structure of a colon in order to provide a different visualization technique to further enhance the polyp detection (see Bartroli, abstract).

Re Claim 18: Bartroli further discloses displaying said virtual dissection (Bartroli discloses the virtual dissection which is similar to Summers surface unfolded colon) and said selected characteristics (Summer discloses the coloring or highlighting of the shape and curvature features on the anatomical structure).

Re Claim 19: Summer further discloses an anatomical structure is the colon (see Summers, page 289, Section – Discussion, paragraph 2 ["As currently practiced ..."] and paragraph 5 ["The number of false-positives ..."], page 284, abstract ["An abdominal computed tomographic scan ..."], Figure 3).

Re Claim 20: Summer further discloses the colon has characteristics / shape and curvature features comprising cup, rut, saddle, ridge / shaped like ridges, and cap (see page 286, paragraph 2 ["Additional, more restrictive criteria ..."]). (Although Summer doesn't specifically disclose the shape and curvature features could also include cup,

rut, cap, and saddle shapes, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a feature because a cup, rut, saddle, and cap shapes are just different types of shape and curvature features which describe different polyp and colonic wall shapes [see Yoshida {"Computer-aided diagnosis scheme for detection of polyps at CT Colonography", Radio Graphics 2002, as discussed in previous Office Action}, Fig. 10]).

Re Claims 21-22 respectively: Summer further discloses said selected characteristic for enhancement / coloring select false-positives are fluid data and contrast enhanced fecal matter data (Although the current Summers article doesn't specifically disclose that the false-positives which are also highlighted in Fig. 3b are fluid data and contrast enhanced fecal matter data, a corresponding Summers article ["Challenges for computer-aided diagnosis for CT colonography" – 2002 - Abdom Imaging 27: pp. 268-274] clearly discloses distinguishing fecal matter and fluid [see Summers "Challenges for computer …", page 268, paragraph 6 {"Radiologists can recognize a number of polyp mimics …"}, page 271, paragraph 1 {"An important objective of CTC interpretation is …"}]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a feature where the select display values are fluid data and contrast enhanced fecal matter data because these data's have there own specific shape, curvedness, and texture values and ranges which a detection could possibly be made for).

Re Claim 23: Summer further discloses said selected characteristics for enhancement / coloring select parts of colon meeting both primary and restrictive shape and curvature features are shape data (see Summers, page 289, Section – Discussion, paragraph 2 ["As currently practiced ..."] and paragraph 5 ["The number of false-positives ..."], page 284, abstract ["An abdominal computed tomographic scan ..."], page 286, paragraph 2 ["Additional, more restrictive criteria ..."], page 286, paragraph 4 ["Transverse CT scans through ..."], lines 12-15).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Krasnic whose telephone number is (571) 270-

1357. The examiner can normally be reached on Mon-Thur 8:00am-4:00pm and every other Friday 8:00am-3:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Bernard Krasnic
April 10, 2008
/Jingge Wu/
Supervisory Patent Examiner, Art Unit 2624